Notes from 12/20/17 Call/Webex Meeting
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These are brief notes from the call, for discussion internally with EPA, DOH and INNOVEX.

<u>First Part of Meeting</u>

- Trend analysis in wells (slides 13, 14, 15, 16) simplified: must be able to do better and to help infer recharge effects without complex model needed? There appear to be different patterns here and possibly lag-times
- Weights don't account for any systematic changes over time, of which there may have been e.g. due to recharge
- Question asked: "do water level data account for corrected Top of Casing elevations?"
  - Jeff Johnson replied "yes" for 2017 data, not necessarily factored in for older data?
  - Morgan is checking this
  - Extensive discussion on this topic: suggests this work not yet completed or checked
  - They are trying to get their WL data correct for the three periods to look at TPG (2006, 2015, 2017)
- Use of the 95% confidence interval is confusing:
  - Not really applicable in this context
  - Understand what is being attempted in the summary but this isn't random error but rather systematic differences due to recharge and pumping
- Use of three point gradients:
  - I think we should go ahead and calculate these ourselves, independently, using all data. [See an example below.] We should always plot ALL the data if we can, and then the steady-state *or* transient model can be plotted on it, and compared to:
    - A simple azimuth average or
    - A vector-(magnitude) weighted azimuth average
- Pumping information presented in the meeting:
  - Do we have this detailed pumping data? (it is short term it seems)
- Water level maps:
  - Prepared for 2006, 2015, 2017 as snap-shot steady state
  - Location weighting discussion slide 40 seems to be subjective. Reasonable, but subjective
- Error margins on measurements in water levels discussion:
  - Talked about +/- 2 ft when considering barometric, etc.
  - This seems to confuse measurement error with structural error or simplifications, its not measurement error alone. Could be misleading in model calibration
  - Probably need a more thorough documentation of actual "error" vs structural simplifications for the final model (not interim)
  - John (INTERA) described heads at Halawa shaft versus those in Red Hill, and the magnitude of the head "errors" in the calibration, and how critical it is to keep the head difference right
  - It was also discussed that the level in the Halawa shaft may not represent an aquifer water level, but is a "pool" in the shaft. Disagreement on this.
    - Sometimes may represent pumping conditions when pumping from Halawa shaft

- Other times when not pumping, then is a good "ambient" though "drained" water level representing a line sink in the aquifer
- Transient calibration:
  - Equal weighting for pumped wells and shafts as for monitoring wells?
  - But aren't shafts quite substantial geometrically? And aren't they simply a drain – are there substantial losses (beside geometric within grid block)
- Recharge and precip:
  - Slide 46 - get these rain gage data: the two rain gages show very different precip (factor of about 2 to 5 depending on year)
  - GSI/AECOM plan using multiplier factor to the "average" condition
  - Why not use convolution to try and get that lag time and effect of recharge?
  - I recommend that we try to illustrate this before January, because this may help the interim model and would definitely benefit the final model (F&T)

Parameters

- No major comments on this: it is more open and representative than I had anticipated based on prior calls
- Need to think about the anisotropies more than anything else, as this will affect directions in addition to rates

Water Level Mapping

- Done in surfer (default options?)
- Latest info in RHMW11 not included (?) – what do they mean by this? Latest WL data I assume
- STEP 1:
  - Use of control points – where?
  - Mapping whole domain combines areas of different trends – represent the contact (which is almost a line) as a line sink-source?
  - Use MEUK with a line sink to separate
- STEP 2:
  - Has some control points, improved, but unclear why control points selected and on what basis
  - Concern might be using old models as basis for adding control points to water level mapping, which is backward
  - Why not use surface water features and creeks etc as controls on top of water levels? There is good information not being used
- STEP 3:
  - Has more control points, some of which might now be removed
- Problem is, the valleys and saprolite areas are not being represented, and the two zones (upgradient and downgradient) should be separated; and a nugget should be used to get effectively a block-average head over some reasonable distance
- What about the Halawa shaft control point? Seems odd to even need this here, and may give a misleading impression
- Can we request these specific data (with screens) so we can work with the WL maps?
- Overall, concerns that the WL maps seem to be a little misleading – and while recognizing they are "general" there is little doubt they will end up being used for other purposes

- There seems to be a closed depression always at Halawa shaft area:
  - 15 ft elevation, there is a data point there
  - This is perfect for WL mapping with a pumping drift term here, which is what should be done
- See slide 79 for the comparison of mapped WL with SUTRA – some stark differences, but perhaps mostly down in the lowland area, not upper area, but that's because the model was used in a backward sense to create the WL maps

Survey Summary

- Included adjustments / corrections of up to about 0.5 ft.

Model Development

- Shared images of grid and discussed the quadtree refinement around surface water, springs, etc.
- Discussed active domain changes with increasing depths

Overall - analysis approach to consider

- Data evaluation still seems a little unsophisticated, but that may be consistent with where the project is perhaps
- Thinking toward model application - this is a good candidate for non-linear predictive maximization perhaps: as-in, what conditions would it take in order to have an impact.
  - That's very different to doing monte-Carlo, etc.
  - Its more focused on the question at hand
  - It enables a few different things to be included that you might not otherwise include if you were doing a monte-carlo as proposed
- This would not be for the interim model analysis, but for the later F&T analysis when focused on influent concentrations and risk